

Oracle SPARC M8 for SAS

Vertical Scaling for Secure, Rapid, Agile Environments
Simplify IT

Maureen Chew, Principal Software Engineer
Gary Granito, Solution Architect, Oracle Solution Center

August, 2017

ORACLE

ORACLE
SOLUTION CENTER

Copyright © 2015, Oracle and/or its affiliates. All rights reserved. |

Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Agenda

- 1 Setting the Stage
- 2 Security
- 3 Performance
- 4 Thinking IT Differently

Setting the Stage

Does This Matter to IT?

Does IT Matter?

- Application Deployments ARE NOT One Size Fits All
- Horizontal Scale - Great for some applications
- Vertical Scale – Great for some applications
- Divergent? Complementary? Viewpoints - Political, Religious,
 - IT's about Choice
 - IT's about Diversity

Think IT Differently

Does This Matter to IT?

- Security
- Application Performance
- Scalability of Workloads
- Ability to Respond to Ever Changing Dynamics
- Software Development Quality and Quality of Software Applications
 - Security
- Simplicity, Agility

Agenda

- 1 Setting the Stage
- 2 Security
- 3 Performance
- 4 Thinking IT Differently

Security

Is secur**IT**y a Top Priority?

Solaris is a Proven Choice When Security Matters



“There is nothing more important in the modern cloud than securing your data... That is job #1 at Oracle and the promise we make to you for the next 30 years”

Oracle OpenWorld

Larry Ellison, CTO and Executive Chairman of the Board, Oracle

Is SecurITy a Concern?

Think IT Differently



When Asked What He Values Most in their Oracle SPARC SuperCluster:
“Nothing Beats the Security in Solaris”

– Sr. Manager, IT Application Development, Top Global Airline

The US Defense Information Systems Agency (DISA)

- The Department of Defense (DoD) collectively runs one of the largest, global IT operations in the world
- DISA partners service nearly all of the major DoD programs of record
- SPARC/Solaris: on the DISA partner approved buy-list

When SecurITy Matters – Look to Solaris



UNCLASSIFIED

ORACLE SOLARIS 11 SECURITY TECHNICAL IMPLEMENTATION GUIDE (STIG) OVERVIEW

Version 1, Release 3

24 April 2015

http://iasecontent.disa.mil/stigs/zip/Apr2015/U_Solaris_11_SPARC_V1R3_STIG.zip

UNCLASSIFIED

Oracle Solaris 11 STIG Overview, V1R3
24 April 2015

DISA
Developed by Oracle in coordination with DISA for the DoD

TABLE OF CONTENTS

	Page
1. INTRODUCTION.....	1
1.1 Executive Summary.....	1
1.2 Authority.....	1
1.3 Vulnerability Severity Category Code Definitions.....	1
1.4 STIG Distribution.....	1
1.5 SRG Compliance Reporting.....	2
1.6 Document Revisions.....	2
2. CONCEPTS AND TERMINOLOGY CONVENTIONS.....	3
2.1 Introduction.....	3
2.2 Audience.....	3
2.3 Security Evaluations.....	4
2.4 Oracle Solaris Versions.....	4
2.5 Oracle Solaris 11 references.....	4
2.6 Oracle Solaris 11 STIG organization.....	5
2.7 Solaris Security Concepts.....	5
2.8 Naming Services.....	5
2.9 Roles and Profiles.....	6
2.10 Profile usage in the STIG.....	6
2.11 Profiles Examples.....	7
2.12 Auditing.....	8
2.13 Reviewing Audit Logs.....	8
2.14 Auditing Examples.....	9
2.15 System Packaging.....	9
2.16 System Package examples.....	10
2.17 System Services.....	10
2.18 System Services Examples.....	11
2.19 Network Access Controls.....	12
2.20 Network Interfaces.....	12
2.21 TCP/IP Level control.....	12
2.22 Firewall Protection.....	12
2.23 TCP Wrappers.....	13
2.24 Network Encryption.....	13
2.25 Network Command Examples.....	13
2.26 File Systems.....	14
2.27 Sample ZFS commands.....	14
2.28 Zones.....	15
2.29 Immutable Zones.....	16
2.30 Trusted Extensions.....	17

provides a solid foundation for company data and applications to
in transit. Oracle Solaris resource management and Oracle Solaris
to separate and protect applications from misuse. This contains
is implemented through privileges and the role-based access control
in Solaris, reduce the security risk of intruder or regular user action
encrypted protocols such as IP security (IPsec) provide virtual
tunnels across the Internet, as well as tunnels within a LAN or a WAN
Additionally, the auditing feature of Oracle Solaris ensures that records in
Oracle Solaris 11 security services provide defense-in-depth protection
for the system and the network. Oracle Solaris protects the kernel
utilities, what privileged actions the utility can perform. This
function provides data protection on the system and across the wire.
Oracle Solaris, and Kerberos can provide additional protections.

Security services include:

the kernel – Kernel daemons and devices are protected by file permissions.

memory – Address space layout is randomized for userland processes.
logins – Logins require passwords. Passwords are strongly encrypted and initially limited to an encrypted and authenticated channel through the use of Oracle Solaris. The root account cannot log in directly.

data – Data on disk is protected by file permissions. Additional protection can be configured. For example, you can use access control lists to encrypt a file, encrypt an Oracle Solaris ZFS dataset, create snapshots, and mount file systems so that setuid programs cannot be run or to be executed.

When SecurITy Matters

- Most of the largest DoD ERP programs run on SPARC SuperCluster
 - Utilizing
- On-board hardware cryptographic co-processors for improved encryption processing
 - Transparent Data Encryption, RBAC Profiles for administrator privilege management
 - OVM for SPARC secure virtualization: PDOMs, LDOMs, Solaris Zones
 - Grid Infrastructure multi-tenancy: DB-Unique keys, DB-scoped or ASM-scoped security on Exadata

Agenda

- 1 Setting the Stage
- 2 Security
- 3 Performance
- 4 Thinking IT Differently



SPARC T8 and M8 Servers

ORACLE
SOLUTION CENTER

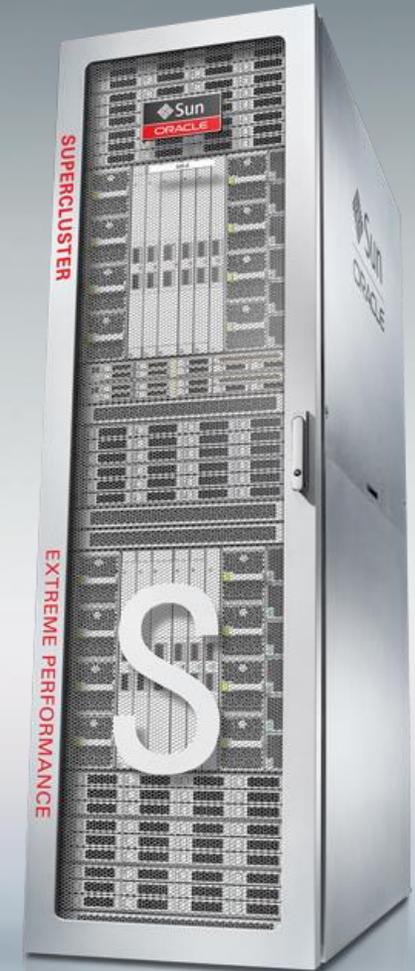
sas
THE POWER TO KNOW.



SPARC T8 Servers



SPARC M8 Server



SuperCluster M8

Oracle SPARC T8 and M8 Servers

Powered by the Oracle M8 processor



	T8-1	T8-2	T8-4	M8-8
M8 5.0GHz Procs	1	2	4	8
Max Cores	32	64	128	256
Max DIMM Slots	16 DDR4	32 DDR4	64 DDR4	128 DDR4
Max Memory*	1 TB	2 TB	4 TB	8 TB
PCIe Gen 3 Slots	6(x8), or 2(x16) + 2(x8)	4(x16) + 4(x8)	8(x16) + 8(x8)	Up to 24(x16)
Storage (SSD/HDD)	8	6	8	-
Storage (NVMe)	4	4	8	12 (AIC)
Rack Space	2RU	3RU	6RU	10U

1.4x Faster than
the Previous
Generation

* Using 64 GB DIMMs

Performance

Multiple Dimensions of Performance and Scale Up

- Compute Strand Performance
- Scale Up – Multi-Stream
- Scale Up – Highly Threaded Stream
- Scale Up – Both (Multi-Streams of Highly Threaded Streams)



SAS on Oracle SPARC M8

System Under Test

- SPARC T8-2
 - 2 x 5.067 GHz SPARC M8, 512 GB RAM
 - Storage: ZFS file system – 4 NVME drives
 - Solaris 11.3
- SPARC *T8-1* – 1 socket Logical Domain of above T8-2
 - 1 x 5.067 GHz SPARC M8 (32 cores), 256 GB RAM
 - Not technically T8-1 but referred to as such here
- All references to M8 herein refer to the SPARC M8 processor in above system

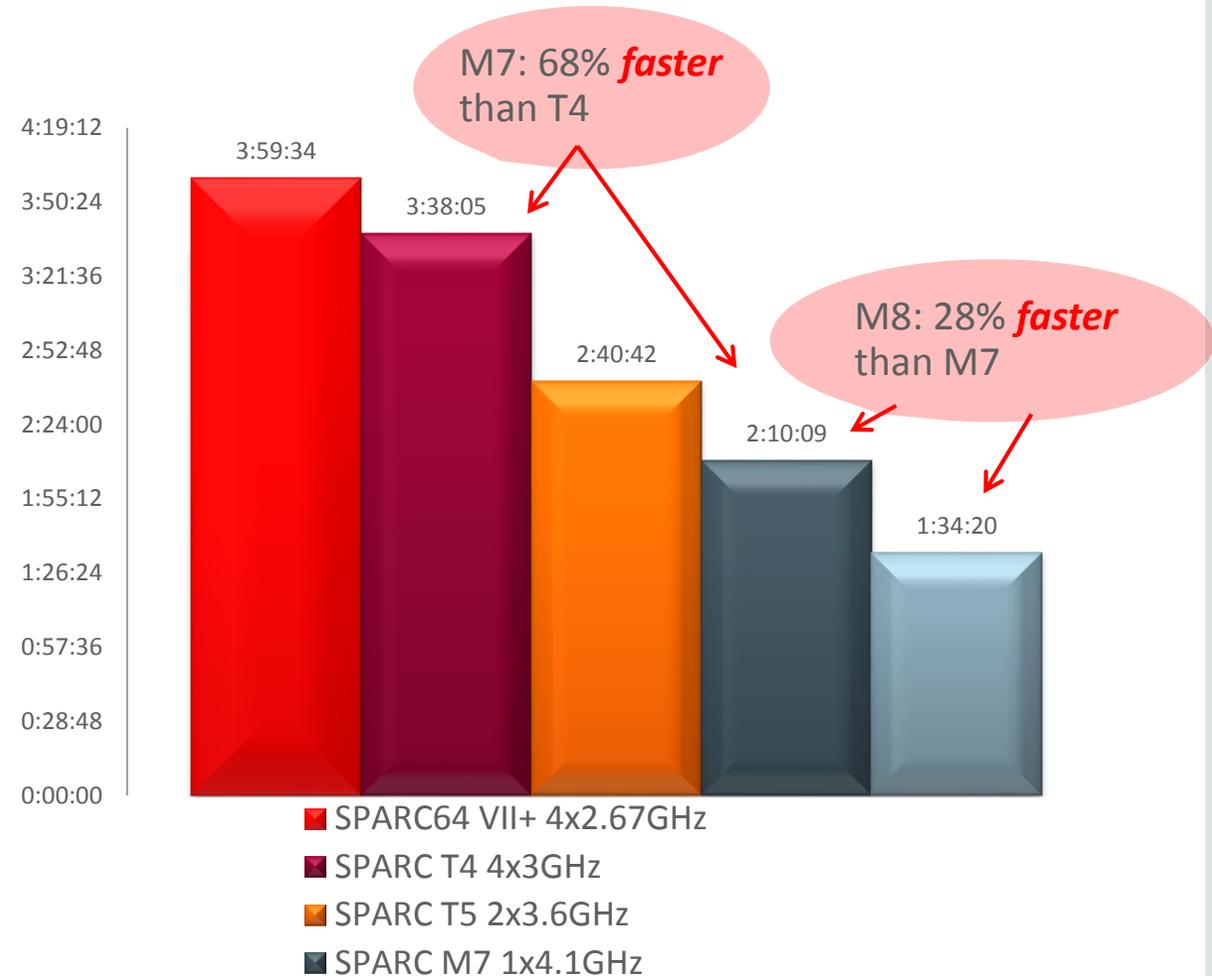
Performance

Multiple Dimensions of Performance and Scale Up

- Compute Strand Performance
- Scale Up – Multi-Stream
- Scale Up – Multi-Threaded Stream
- Scale Up – Both (Many Multi-Threaded Streams)

Compute Strand Performance

- BOST – Bunch of SAS Tests – a simple baseline
- Cumulative runtime for real world SAS applications – DATA step (of course!), REG, LOGISTIC, MIXED, GLM, SQL, SUMMARY, FREQ, SORT, etc
- Single threaded (mostly), serial tests



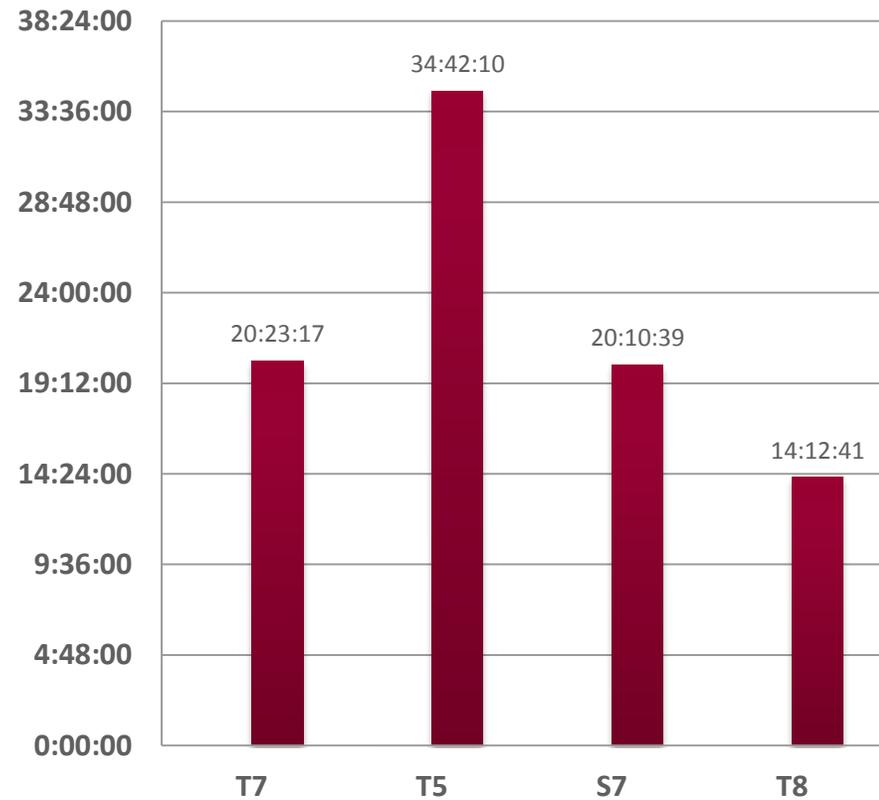
SAS Compute Performance (Cont)

- Compute Strand Performance
 - Total time for serial test run
 - CPU<->Memory intensive, large data, single threaded (mostly)

SAS Serial Test Compute:

T5/M8: 2.44x

T7/M8: 1.43x

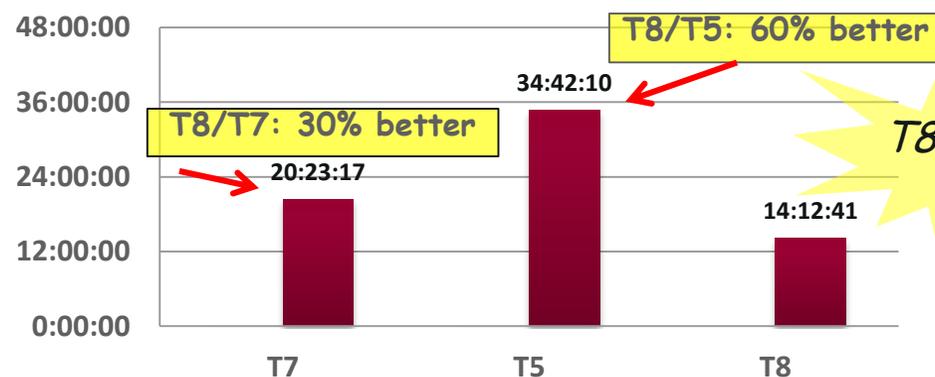


SAS on SPARC T8: 2 Performance Highlights

- ~85 SAS analytical compute strand tests (large data)
 - Regression, GLM, canonical discriminant analysis, univariate/bivariate kernel density estimation, Markov chain Monte Carlo simulation, neural net, decision tree, ...
- **T8 Faster: 30% T7, 60% T5**

- Multi-User, Multi-threaded SAS High Performance Analytics
- Mean Time to Analytics
 - Install + 5 SAS HPA PROCs run in parallel, 100GB data
- Install, Run & Done
 - Stopwatch Time: **T8 50% faster**

SAS Serial, "Single Threaded" Compute Test



T8: Fast!



T7-2



T8-2

Performance

Multiple Dimensions of Performance and Scale Up

- Compute Strand Performance
- Scale Up – Multi-Stream
- Scale Up – Highly Threaded Stream
- Scale Up – Both (Multi-Streams of Highly Threaded Streams)



SAS on M8 : Real World Scalability/Concurrency Workload

US Federal Agencies Governing International Trade

- Key agency vital to US Economic Policies on International Trade
 - Imports, Exports, Tariffs, global safeguards, etc.
 - Trade data and trade policy data gathered, analyzed
 - Critical info for US Government to shape informed US Trade policies
- SAS Analytics – Vital Role to Results Delivery
 - IT Saavy Economist & Statistician developed scalability test
 - Model performance heuristics using real tests
 - CPU Utilization, I/O, Memory, Performance under load

SAS on M8 : Real World Scalability/Concurrency Workload

US Federal Agencies Governing International Trade

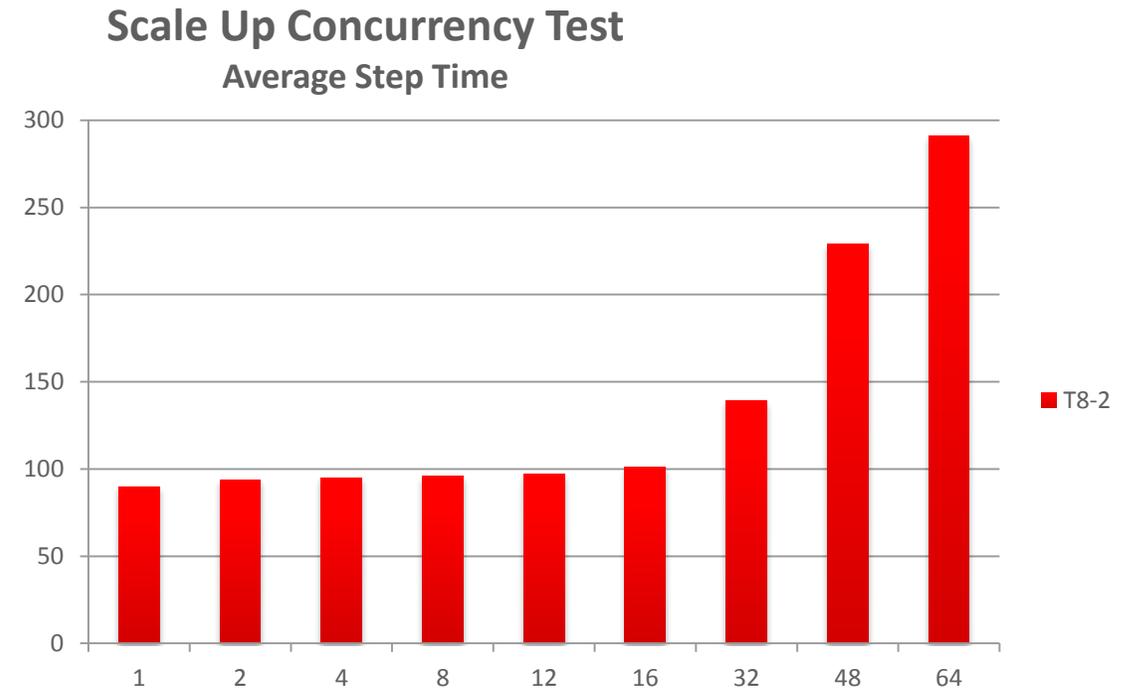
- Concurrency Scalability should be key “Performance” metric
 - Few users have exclusive rights to Compute/Storage/Network
 - What happens to performance as concurrency increases?
- What Happens When Subject to Punishing Workloads?
 - Don’t Try This @ “Home” { Datacenter | Cloud }
- **Ask Before, Not After -> Does your environment:**
 - **Scale under load?**
 - **Perform predictably under intense resource consumption?**

Concurrent SAS Workload – Global Trading Application

T8-2 Concurrency Scale: 1 -> 64 Flows

- Massive Workload per *Single* Flow:
 - 750MB RAM used
 - 80+GB I/O to SASWORK
- Average Step time per Flow:
 - Concurrency: 1 flow: 90sec avg
 - Concurrency: 64 flows: <300 sec avg
 - 64X the amount of work completed in just ~3x
 - Total concurrent resource consumption:
 - 48GB RAM
 - 5.1TB of heavy I/O

Average Flow Time at Given Concurrency

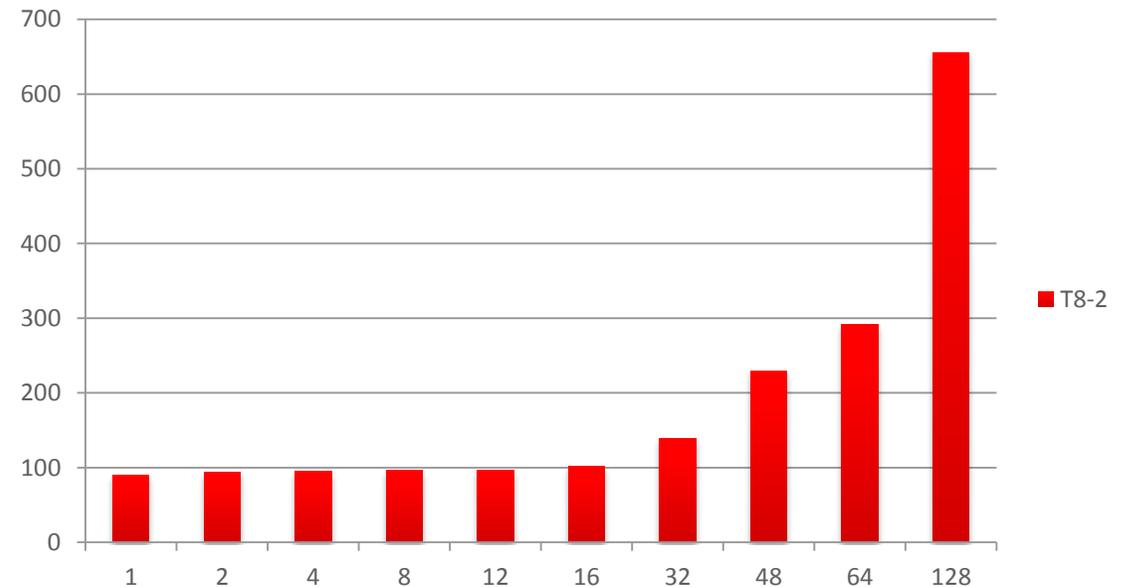


Performance at Scale, but Wait, There's More Oversubscribe by 2X - Does T8 fall over?

Punishing workload

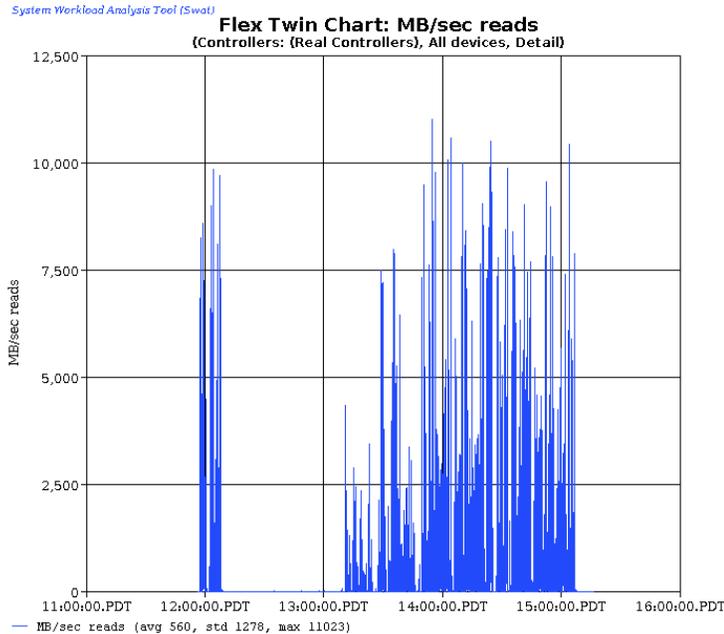
- 128 Flows – 2x CPU Cores
 - 100GB application memory
 - 10 TB I/O churn
- Avg Step time: 650 sec – 2X increase, not exponential
- 128X the work of 1 flow at 6x time
- Robust performance under load reduces risk – Key question for IT

Scale Up Concurrency Test
Average Step Time



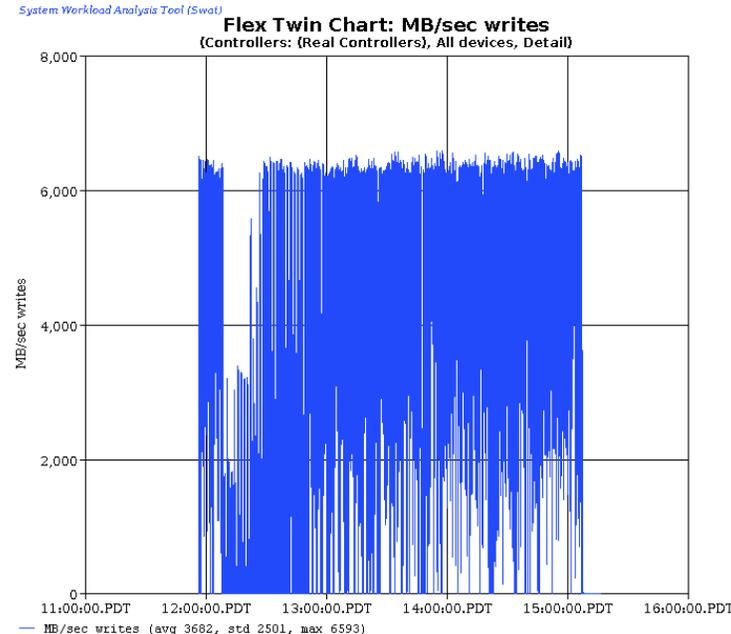
SAS Scalability on T8-2 – I/O View over 3hrs

Concurrency scales from 1 to 128 jobs - Extreme I/O is CONSISTENT



Read Peak: 10+GB/sec
Sustained Peak: 7.5GB/sec

Cache services early load(gap)

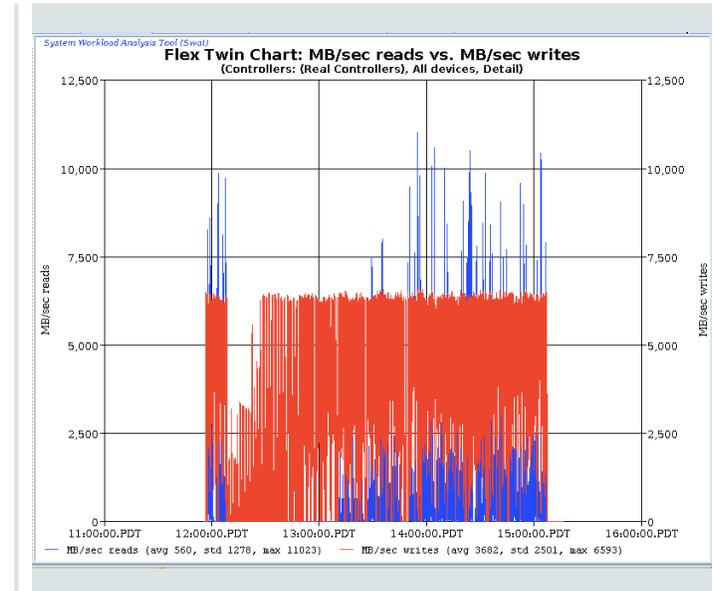


Write: Sustained: ~6.2GB/sec

Concurrency scales:

1-128 jobs on 64 cores

I/O throughput is consistent over time at increasing and punishing load

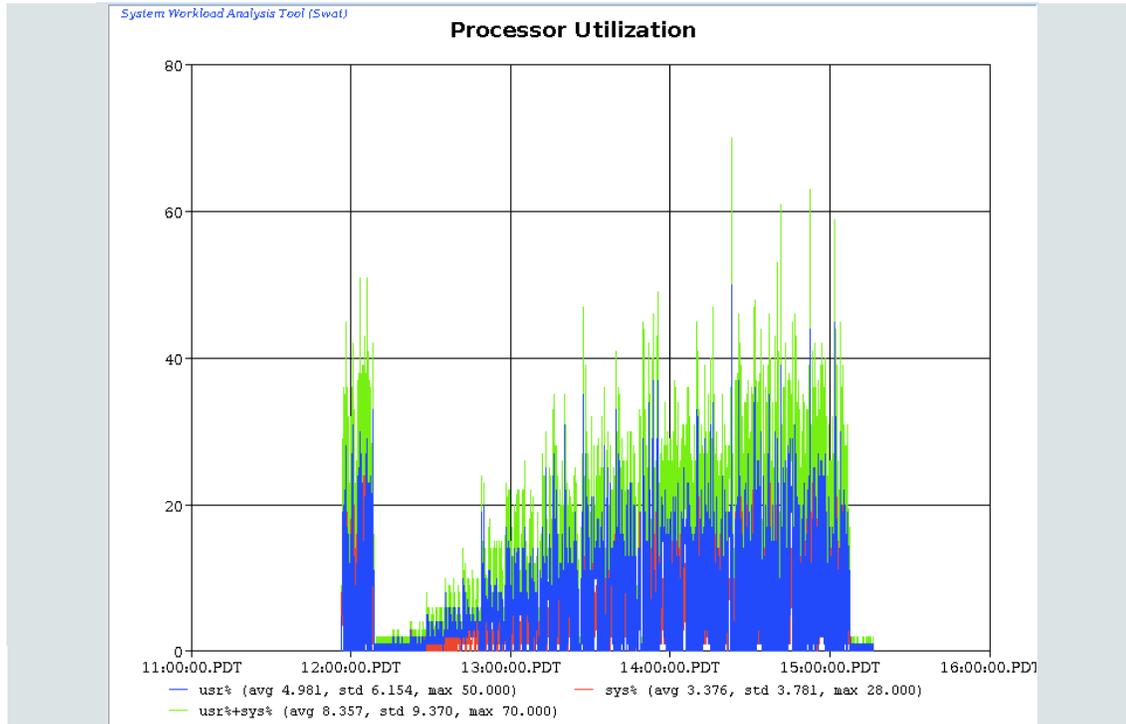


Combined I/O: **Read(left), Write(right)**

Intense write->flummox read cache? NO!
Excellent & consistent read performance @ 10+GB/sec peaks

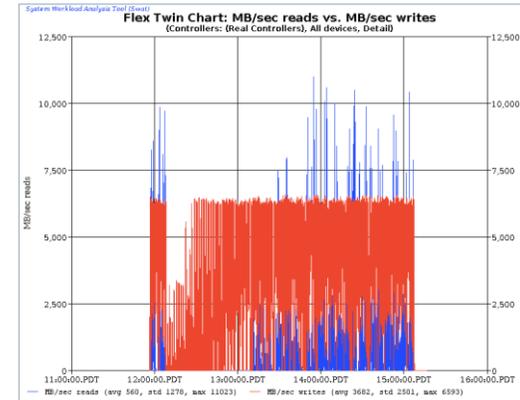
SAS Scalability on T8-2

CPU Utilization, T8/T7 I/O comparison on same workload



CPU Utilization for full workload run

~50% CPU capacity left even at peak workload

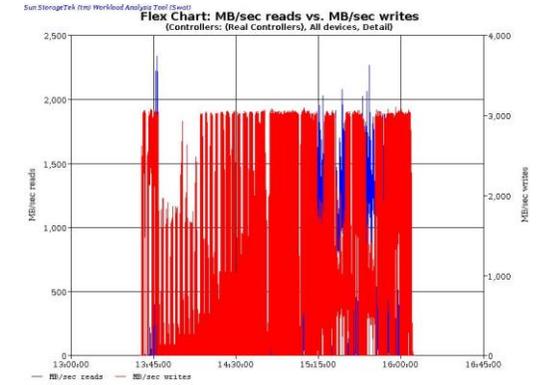


T8 I/O throughput

Sustained write:

~6.3 GB/sec

Read peak: **10 GB+/sec**



T7 I/O throughput

Sustained write:

~3 GB/sec

Read peak: **~2.5GB+/sec**

Extreme T8 CPU <-> Memory Bandwidth Boosts I/O

Performance

Multiple Dimensions of Performance and Scale Up

- Compute Strand Performance
- Scale Up – Multi-Stream
- Scale Up – Highly Threaded Stream
- Scale Up – Both (Multi-Streams of Highly Threaded Streams)



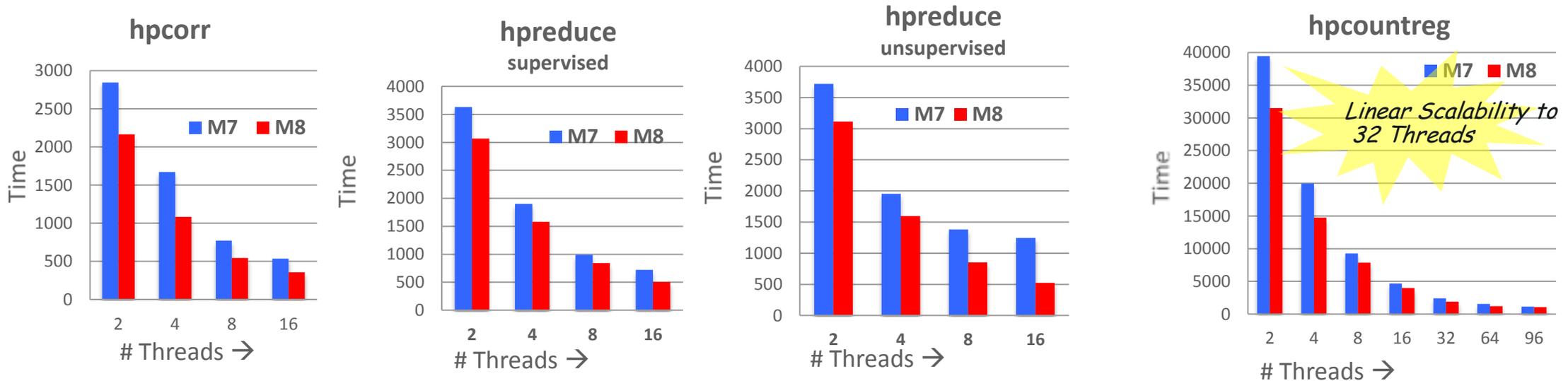
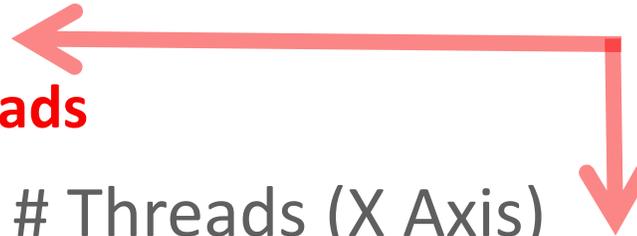
Scale Up to Meet Big Data Challenges

**Oracle SPARC M8 Handles Complex Workloads.
How Can It Solve Big Data Problems NOW?**

Extreme Scalability – M7: Great, M8: Even Better

SAS High Performance Analytics Scalability on T8-2

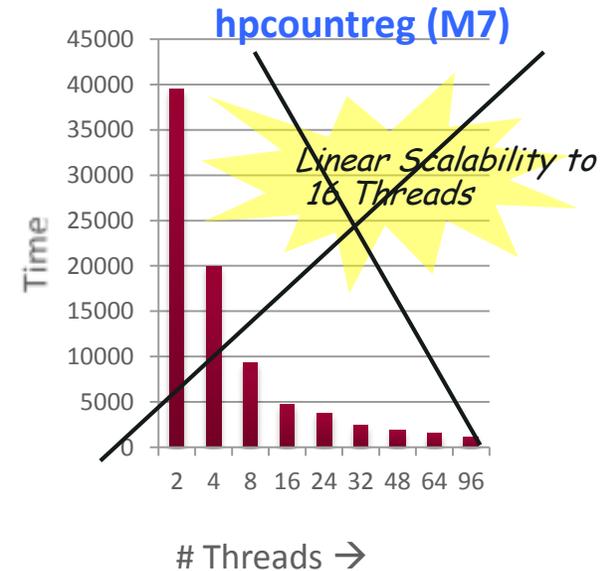
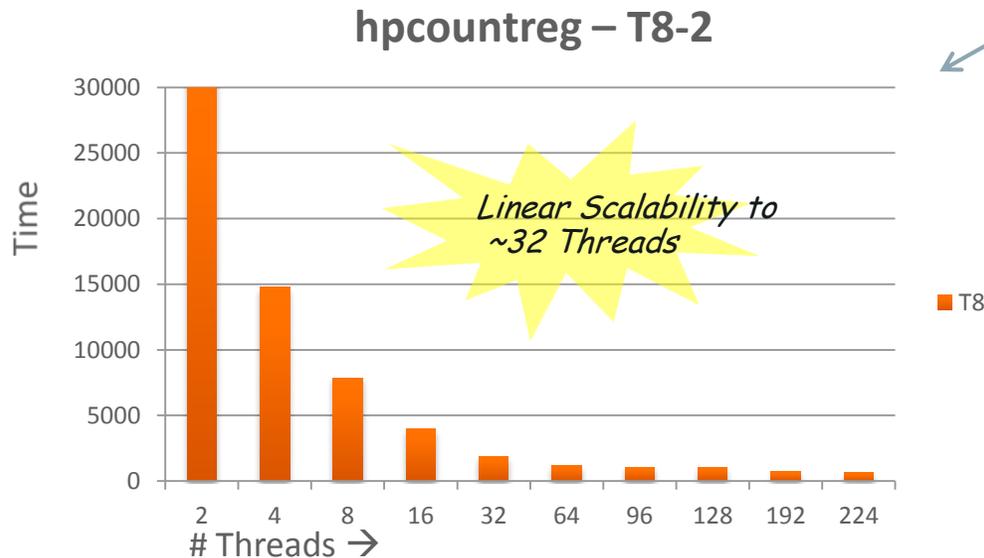
- HPCOUNTREG – Scales to 224 threads
 - **8.75 HOURS@2 threads --> 10 min@224 threads**
- SAS HPA jobs - Runtime seconds (Y Axis), # Threads (X Axis)



Extreme Scalability- M7: Great, M8: Even Better

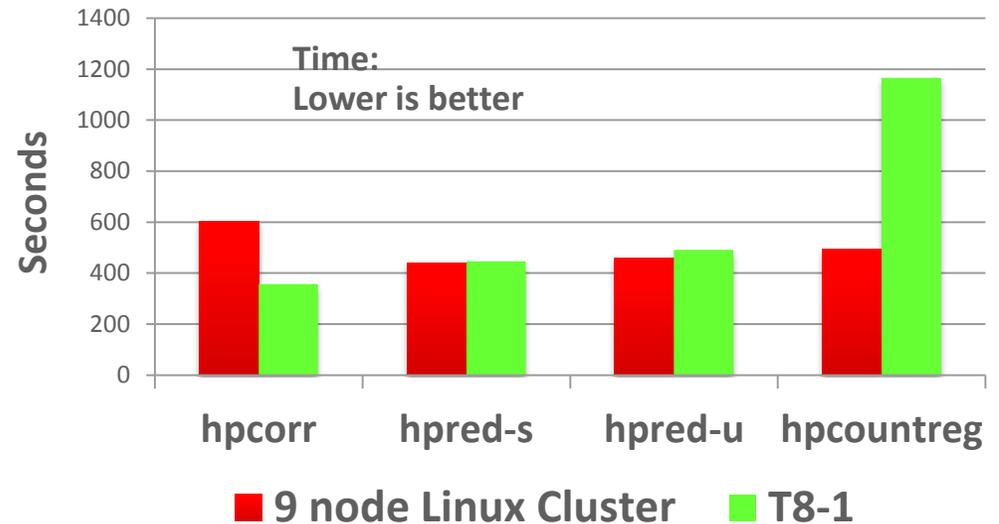
SAS High Performance Analytics Scalability on ~~M7-8 (48 core partition)~~ T8-2

- HPCOUNTREG – Scales to ~~96~~ 224 threads
 - ~~~11 HOURS@2 threads~~ → ~~19 min@96 threads~~
 - **~8.75 HOURS@2 threads** → **~10min@224 threads**
- SAS HPA jobs - Runtime seconds (Y Axis), # Threads (X Axis)



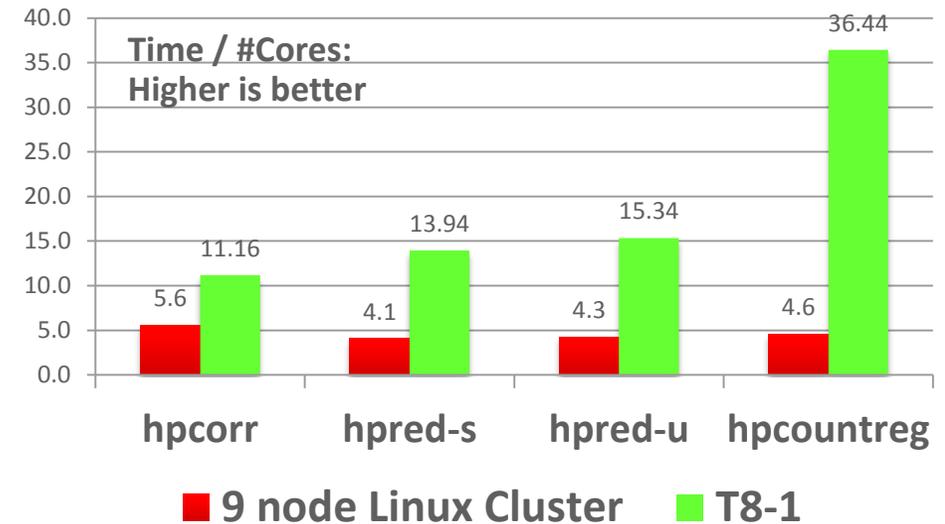
Comparative Performance – 9 node Linux Cluster, T8-1

- SAS HPA Performance – Seconds
 - Linux cluster (108 cores) over HDFS
 - T8-1 (32 cores) with Flash
- Input data set
 - 100 GB
 - 12M rows, 1100 columns
- Not an apples to apples comparison
 - Re-think scale up vs. scale out



Normalized Performance – 9 node Linux to T8-1

- Performance / #Cores Ratio
- SAS licensing – by Core
- Simplicity in Keeping the Analytics “Lights On”

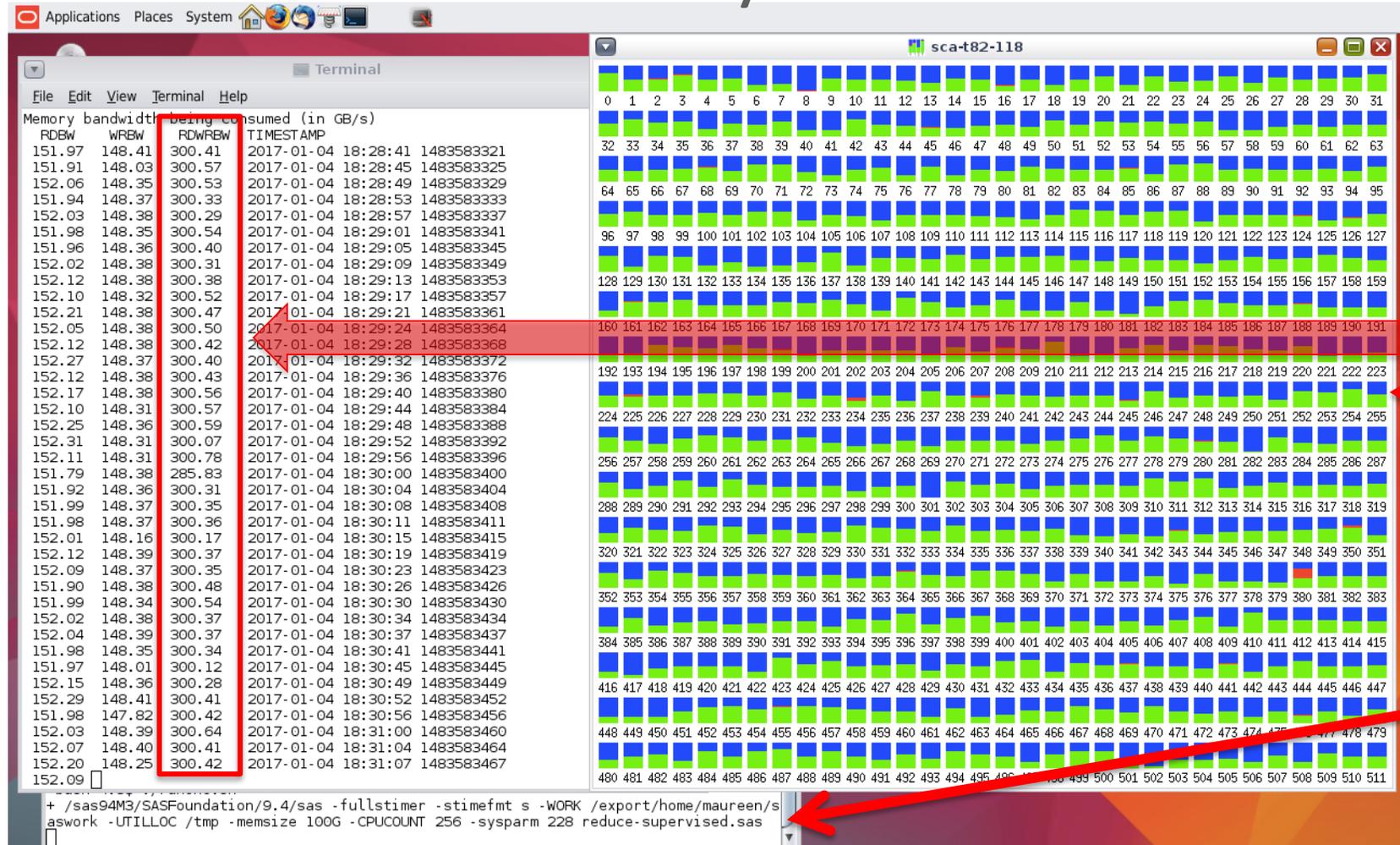


What's the Secret to the M8 Performance?

Industry Leading CPU <-> Memory Bandwidth Throughput

- CPU <-> Memory Bandwidth
 - T8-1 : 1 socket → **~150 GB/sec**
 - T8-2 : 2 sockets → **~300 GB/sec**

T8-2: CPU to Memory Bandwidth - Industry Leading Performance



CPU<->Memory BW:
300+ GB/Sec !!!



Threads Busy
(Green-User Time)



SAS HPA: Proc Reduce -
228 Threads



Agenda

- 1 Setting the Stage
- 2 Security
- 3 Performance
- 4 Thinking IT Differently

Thinking IT Differently

One Size Deployment Architecture Doesn't Fit All

Vertical Scaling for Hybrid Cloud, Rapid, Simple, Agile Environments

What is Mean Time to Analytics (MTA)?

Simplify IT

- How Fast Can IT Be Done?
 - **Install, Run and Done !**
- It's Just Lunch - not just an Internet Dating Site

Less than 1 hour -
Install to Results?
No Way!



It's Just Lunch – sas **Install, Run & Done** on SPARC M7

```
4.1$ cd /d0/SAS
4.1$ pwd
AS
4.1$ ls
4.1$ cd $HOME/HPA
4.1$ ls
rec.sas          countreg.lst      logs              reduce-unsupervised.lst
log             countreg.sas     reduce-supervised.log  reduce-unsupervised.sas
lst             lmixed.log       reduce-supervised.lst  run.sh
sas             lmixed.lst       reduce-supervised.sas
reg.log         lmixed.sas       reduce-unsupervised.log
4.1$ ./run.sh
  4 SAS High Performance Analytics procedures with combined SAS threadcount=100
job operates on a data set which is 106GB, 1100 variables and ~12M rows
ing: Sunday, March 29, 2015 08:12:58 PM EDT

tting High Performance Count Regression...
tting High Performance Pearson product-moment Correlation...
tting High Performance Mixed - (fit a variety of mixed linear models to data)...
tting High Performance REDUCE (variable reduction - supervised) ...
tting High Performance REDUCE (variable reduction - unsupervised) ...
ng for jobs to finish ...

ed: Sunday, March 29, 2015 08:59:46 PM EDT
4.1$ █

--r-- 1 sas  staff    0 Mar 29 20:12 countreg.lst
--r-- 1 sas  staff  8250 Mar 29 20:16 lmixed.lst
--r-- 1 sas  staff    0 Mar 29 20:13 reduce-supervised.lst
--r-- 1 sas  staff 224658 Mar 29 20:44 reduce-unsupervised.lst
4.1$ ls -l *.log
--r-- 1 sas  staff   4515 Mar 29 20:49 corr.log
--r-- 1 sas  staff    0 Mar 29 20:12 countreg.log
--r-- 1 sas  staff  4925 Mar 29 20:16 lmixed.log
--r-- 1 sas  staff    0 Mar 29 20:13 reduce-supervised.log
--r-- 1 sas  staff   4649 Mar 29 20:44 reduce-unsupervised.log
4.1$ █
```

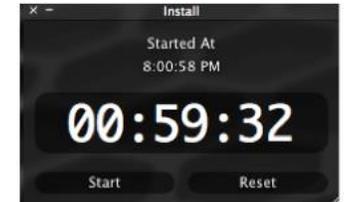
Min 58 – All 5 jobs DONE!!

What is Mean Time to Analytics (MTA)? Simplify IT

- **Install, Run and Done** < 1 HR
 - Install AND completion of 5 heavy duty SAS High Performance Analytics procedures all using data larger than 100GB in the time it takes to have lunch



Game
Changer



Fantastic!!! But what if... there's no time for lunch?

It's Just Coffee – sas **Install, Run & Done** on SPARC T8-2

```
bash-4.4$ ./install.sh
Wednesday, August 2, 2017 08:09:17 PM EDT
+ /fo/depot/setup.sh -responsefile /export/home/maureen/install/response.txt

Preparing the SAS Deployment Wizard...
Launching the SAS Deployment Wizard...
+ date
Wednesday, August 2, 2017 08:14:05 PM EDT
bash-4.4$

Launch 5 SAS High Performance Analytics procedures with combined SAS threadcount=130
Each job operates on a data set which is 106GB, 1100 variables and ~12M rows

Starting: Wednesday, August 2, 2017 08:14:07 PM EDT

Submitting High Performance Count Regression...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 64 countreg.sas
Submitting High Performance Pearson product-moment Correlation...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 16 corr.sas
Submitting High Performance Mixed - (fit a variety of mixed linear models to data)...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 2 lmixed.sas
Submitting High Performance REDUCE (variable reduction - supervised) ...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 16 reduce-supervised.sas
Submitting High Performance REDUCE (variable reduction - unsupervised) ...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 32 reduce-unsupervised.sas
Waiting for jobs to finish ...

Finished: Wednesday, August 2, 2017 08:39:27 PM EDT  Logs and lst files:
```

Min 29 – All 5 jobs DONE!!

```
bash-4.4$ ./install.sh
Wednesday, August 2, 2017 08:09:17 PM EDT
+ /fo/depot/setup.sh -responsefile /export/home/maureen/install/response.txt

Preparing the SAS Deployment Wizard...
Launching the SAS Deployment Wizard...
+ date
Wednesday, August 2, 2017 08:14:05 PM EDT
bash-4.4$

bash-4.4$ ./run-test.sh
bash-4.4$ ./run-test.sh
Launch 5 SAS High Performance Analytics procedures with combined SAS threadcount=130
Each job operates on a data set which is 106GB, 1100 variables and ~12M rows

Starting: Wednesday, August 2, 2017 08:14:07 PM EDT

Submitting High Performance Count Regression...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 64 countreg.sas
Submitting High Performance Pearson product-moment Correlation...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 16 corr.sas
Submitting High Performance Mixed - (fit a variety of mixed linear models to data)...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 2 lmixed.sas
Submitting High Performance REDUCE (variable reduction - supervised) ...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 16 reduce-supervised.sas
Submitting High Performance REDUCE (variable reduction - unsupervised) ...
+ /fo/sas94M4/SASFoundation/9.4/sas -fullstimer -stimefmt s -WORK /saswork -UTILLOC /saswork/uttiloc
-memsize 100G -CPUCOUNT 128 -sysparm 32 reduce-unsupervised.sas
Waiting for jobs to finish ...
```

SAS HPA jobs submitted in parallel at min 4:48

Extreme Scalability in 2 Dimensions – SAS HPA on T8

5 Intense SAS HPA Jobs In Parallel – started 20JUL@10:17pm; completed by 10:41pm

NOTE: The **HPCORR** procedure is executing in single-machine mode.

NOTE: The PROCEDURE HPCORR printed pages 1-101.

NOTE: PROCEDURE **HPCORR** used (Total process time):

real time	1185.61 seconds
user cpu time	18878.23 seconds
system cpu time	66.01 seconds
memory	943994.84k
OS Memory	950560.00k

*Time: ~20min, Threads:16,
Memory: ~1GB*

Timestamp July 20, 2017 10:37:22 PM

NOTE: The **HPLMIXED** procedure is executing in single-machine mode.

NOTE: Convergence criterion (ABSGCONV=0.00001) satisfied.

NOTE: Estimated G matrix is not positive definite.

NOTE: PROCEDURE **HPLMIXED** used (Total process time):

real time	59.19 seconds
user cpu time	27.92 seconds
system cpu time	28.05 seconds
memory	290537.34k
OS Memory	579256.00k

*Time: ~1min, Threads:2,
Memory: ~300MB*

Timestamp July 20, 2017 10:18:37 PM

Each Data Set Size:

~100GB, 12M Rows, ~1100 vars

Total RAM: ~8GB

All jobs complete by 24 min

NOTE: The **HPCOUNTREG** procedure is executing in single-machine mode.

NOTE: Convergence criterion (FCONV=2.220446E-16) satisfied.

.....

NOTE: The data set WORK.SYNOUT has 11795164 observations and 7 variables.

NOTE: PROCEDURE **HPCOUNTREG** used (Total process time):

real time	1453.98 seconds
user cpu time	84236.82 seconds
system cpu time	608.39 seconds
memory	1591821.65k
OS Memory	1691288.00k

*Time: ~24min, Threads:64,
Memory: ~1.6GB*

Timestamp July 20, 2017 10:41:47 PM

NOTE: The **HPREDUCE** procedure is executing in single-machine mode.

NOTE: There were 11795164 observations read from the data set HDFS.SYNDATA.

NOTE: PROCEDURE **HPREDUCE** used (Total process time):

real time	1120.79 seconds
user cpu time	32623.57 seconds
system cpu time	335.53 seconds
memory	2909911.37k
OS Memory	2932328.00k

*Unsupervised: Time: ~19min,
Threads:32, Memory: ~3GB*

Timestamp July 20, 2017 10:36:24 PM

NOTE: The **HPREDUCE** procedure is executing in single-machine mode.

NOTE: Early stop: all remaining effects can be explained by the selected effects.

NOTE: There were 11795164 observations read from the data set HDFS.SYNDATA.

NOTE: PROCEDURE **HPREDUCE** used (Total process time):

real time	1288.88 seconds
user cpu time	18636.83 seconds
system cpu time	336.50 seconds
memory	2246577.00k
OS Memory	2273496.00k

*Supervised: Time: ~21min,
Threads:16, Memory: ~2.25GB*

Timestamp July 20, 2017 10:39:09 PM

What is Mean Time to Analytics (MTA)?

Simplify IT

- **Install, Run and Done** SPARC M8: < 30 Minutes !!!
 - Install AND completion of 5 heavy duty SAS High Performance Analytics procedures all using data larger than 100GB in the time it takes to have lunch

COFFEE



Game
Changer



SAS Install to High Performance Analytics Results in <30 min

What is your Mean Time to SAS High Performance Analytics Results? >30 min? >1 HR?

- SAS 9.4 Install on Oracle SPARC T8-2
- Install done in ~5 min
- Invoke 5 Demanding SAS High Performance Analytics Jobs in Parallel
 - Combined thread usage in excess of 100 threads
 - Extreme CPU, Memory, I/O utilization
- Full results in less than 30 min
 - See IT in action (2 min video of same Install, Run, & Done in <30min)
- Think IT Differently

Questions?

Thank You!

gary.granito@oracle.com

- Visit: oracle.com/sas
- [Oracle SPARC T8 and SPARC M8 Server Architecture White Paper](#)



Integrated Cloud

Applications & Platform Services